Installing the Enphase Line Communications Filter (LCF)

LCFs are required at large installations that require more than one Envoy Communications Gateway™. Each Enphase LCF contains an Envoy and terminations for phase conductor lines in and out. By running phase conductors through the LCF, it filters power line communications and eliminates any potential inter-Envoy crosstalk in multi-Envoy installations.

Installation Considerations

1. The LCF services a maximum number of Enphase Microinverters per the following table, at a total continuous current of 100 Amps per phase.

208 VAC three-phase, approx 36 kW AC	Microinverters supported
M215-60	166
M190-72	189
M210-84	171
240 VAC single-phase, approx 24 kW AC	
M215-60	111
M190-72	126
M210-84	114

2. See the unit rating label for the compatible AC voltage requirements.
3. Use NEMA 4-rated, water-tight cable glands and hubs for all conduit entry. These must not compromise the integrity of the LCF's NEMA enclosure rating.
4. When determining the installation location for the LCF, account for conduit/cable entry for the bottom or side of the LCF enclosure.
5. Select wire size based on ampacity. At a minimum, you will need:
   - #2-#2/0 copper wire for L1, L2, L3 and neutrals
   - #8 AWG minimum for line grounding wire
   - CAT5E or equivalent for Ethernet
6. The LCF terminal blocks have AC fasteners that require compression to a specific torque value during installation. These terminal blocks connect the circuit conductors from PV load center and the grid load center. The terminal block screws must be set to the recommended torque values as specified by the terminal block manufacturer to securely fasten the conductors. See the following sections for wiring steps and for torque values. **Over-torqueing the set screws can compromise the performance of the LCF**.
7. If you are using aluminum wire, use the specified procedure to install this wire. Refer to the terminal blocks for compatible gauge and wiring type.

DANGER: Risk of electrical shock. Adhere to all warnings and notes.
WARNING: Installation of the LCF must be done by a qualified electrician.
WARNING: Make sure that power is turned off from the utility and from the solar array before connecting the LCF.
WARNING: Ensure that all connnections are torqued to values listed on the terminal block.
NOTE: Perform all wiring in accordance with the National Electric Code and ANSI/NFPA 70.
NOTE: Improper installation and/or maintenance of an LCF could result in reduced product reliability and/or damage to the product.
NOTE: The LCF must be installed between the utility-side circuit and the array-side circuit protection.
NOTE: Any changes or modifications to Enphase equipment not expressly approved by Enphase Energy could void the user's authority to operate this equipment.

1 Mount the LCF

1. Use the mounting holes on the back of the LCF enclosure for installation.
2. Remove all four hole seals and hang the LCF using 8mm mounting hardware with sealing washers.

2 Wire the LCF

1. De-energize all circuits before wiring the LCF.
2. Use antioxidant joint compound on all field termination connection points.
3. On the utility side, use cable ties to hold L1, L2 and L3 together. Allow offset for cable bending.
4. Remove the ferrite core from the assembly bag and slip it over the utility-side wire bundle.
5. Use a torque wrench and the specified hex bit to make the terminations in steps 6, 7 and 8. **Tighten the terminals to the torque values specified on the terminal blocks, according to conductor gauge and material**. See table.
6. Terminate the utility-side lines to the terminal block labeled "**Utility**".
   - For black terminal blocks, use a 3/16 wrench that is at least 1.25 inches long.
   - For grey terminal blocks, use both a 5mm wrench (at least 1.5 inches long) and a 6mm wrench (at least 1.25 long).
7. Terminate the neutral lines to the block labeled "**Neutral**" using an 8mm wrench that is at least 1 and 1/8 inches long.
8. Terminate the array-side lines to the terminal block labeled "**Array**".
   - For black terminal blocks, use a 3/16 wrench that is at least 1.25 inches long.
   - For grey terminal blocks, use both a 5mm wrench (at least 1.5 inches long) and a 6mm wrench (at least 1.25 long).
9. Route the ground wires through the LCF so that they make contact with all hubs and connect them to the ground bus using an approved grounding connection method.

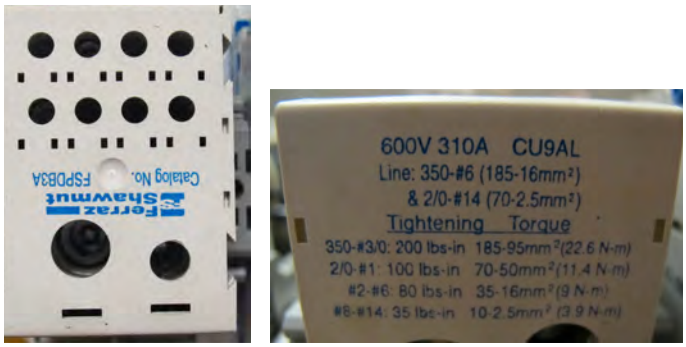
Conductor gauge	Terminal block type and torque specifications		
	Marathon Black (Line)	Ferraz Shawmut (Neutral)	Marathon Grey (Line)
#2/0 - #6	120 lbf-in	---	---
#2/0 - #1	---	100 lbf-in	120 lbf-in
#2 - #6	---	80 lbf-in	80 lbf-in
#8	40 lbf-in	60 lbf-in	40 lbf-in

10. Use a 1/2 inch knockout set to create a conduit knockout on the left side of the enclosure, and pass the CAT5E through the knockout.
11. If needed, to allow the CAT5E to pass through the strain relief, cut and reterminate the CAT5E.
12. Connect the one end of the CAT5E to the Envoy, and connect the other end to the broadband router.
13. After 30 minutes, retighten all terminations to the appropriate torque value. **Do not over-torque.**

Terminal Block Types & Torque Specifications

Marathon Black (Line)

Marathon Grey (Line)



Ferraz Shawmut (Neutral)

3 Turn Up the LCF

All system diagnostics are performed using a Internet-connected computer or laptop and the Envoy. Prior to turn up, ensure that all AC wiring is complete and that the Ethernet connection is complete to the Envoy.

Refer to the *Envoy Communications Gateway Installation and Operation Manual* for more information on the Envoy.

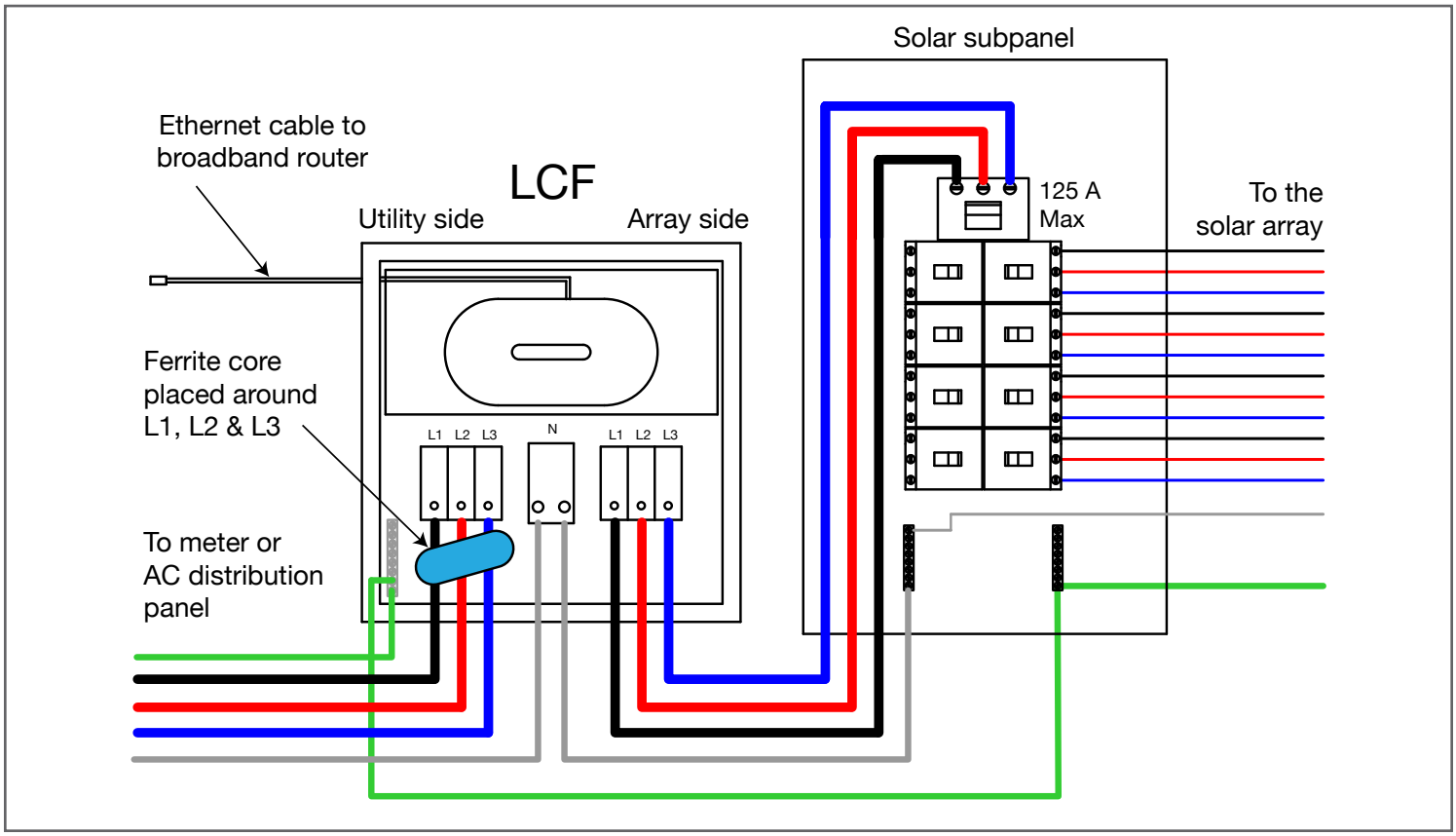
1. Energize the system at the utility side.
2. Energize all the array-side circuit breakers.
3. Flip the blue switch on (to the right of the neutral block) inside the LCF. This breaker protects the Envoy.
4. Ensure the Envoy starts up. The LCD screen will be active.

Periodic Maintenance

During regular scheduled maintenance of the PV system, do the following:

1. De-energize or disconnect all circuits before working with the LCF.
2. Check the terminal blocks for proper torque. The torque values of each terminal block should be checked for compliance with the torque requirements listed on the terminal block.
3. Periodically check that the integrity of the enclosure and all internal connections are not compromised.

LCF Wiring Diagram



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